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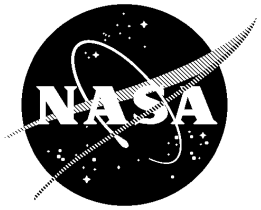
Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) Interface Definitions Document (IDD)

November 1997



National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Earth Science Data and Information System (ESDIS)
Level 1 Product Generation System (LPGS)
Interface Definitions Document (IDD)

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Preface

This document provides a current understanding of the definition of the interfaces between the Level 1 Product Generation System (LPGS) subsystems.

This document is under the configuration management of the LPGS Project Configuration Management Board (PCMB). It will be maintained and updated, as required, by the LPGS Project, with updates and revisions approved by the PCMB.

Changes to this document shall be made by document change notice (DCN) or by complete revision. Questions and proposed changes concerning this document should be addressed to

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Abstract

This interface definitions document (IDD) presents the functional, performance, operational, and implementation requirements for the interfaces between the Level 1 Product Generation System (LPGS) subsystems.

Keywords*: interface definitions document (IDD), Level 1 Product Generation System (LPGS)*

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Section 1. Introduction

1.1 Purpose

This interface definitions document (IDD) presents the interface requirements between the Level 1 Product Generation System (LPGS) subsystems located at the Earth Resources Observation System (EROS) Data Center (EDC).

1.2 Scope

This document provides the functional, performance, operational, and implementation requirements for the LPGS subsystem interfaces. It is intended for all parties requiring such information, including system engineers and system designers responsible for implementing the interfaces and system maintenance personnel responsible for maintaining the interfaces.

1.3 Organization

This document is organized into four sections. Section 1 provides an introduction. Section 2 discusses all LPGS subsystem communications, which includes data communicated between the Process Control Subsystem (PCS), Data Management Subsystem (DMS), Radiometric Processing Subsystem (RPS), Geometric Processing Subsystem (GPS), Anomaly Analysis Subsystem (AAS), and Quality Assessment Subsystem (QAS). Section 3 explains the RPS and GPS interface. Section 4 addresses user interface (UI) communications.

1.4 Applicable Documents

The following documents contain additional details regarding the LPGS, the Landsat 7 System, and external systems.

1.4.1 Specification Documents

The following documents provide the basis for developing the LPGS subsystem interface definitions presented in this document:

1. National Aeronautics and Space Administration (NASA)/Goddard Space Flight Center (GSFC), 510-3SUG/0297 (CSC 10037610), *Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) User's Guide*, Draft, August 1997

2. --, 510-4DDS/0197 (CSC 10038085), *Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) Detailed Design Specification*, Review, August 1997

3. --, 510-4PDS/1097, *Level 1 Product Generation System (LPGS) Preliminary Design Specification*, April 1997

4. --, 510-3OCD/0296 (CSC 10034093), *Level 1 Product Generation System (LPGS) Operations Concept*, February 1997

5. --, 510-4SDS/0196 (CSC 10034686), *Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) System Design Specification*, March 1997

6. --, 510-FPD/0196, *Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) Functional and Performance Requirements Specification*, February 1997

7. --, 430-11-06-007-0, *Landsat 7 Zero-R Distribution Product Data Format Control Book, HDF Version*, September 1997

8. --, 510-3DFC/0197, *Earth Science Data and Information System (ESDIS) Level 1 Product Generation System (LPGS) Output Files Data Format Control Book*, August 1997

9. --, 430-L-0002-H, *Landsat 7 System Specification*, August 1994

10. Hughes Information Technology Systems, 209-CD-013-003, *Interface Control Document Between EOSDIS Core System (ECS) and the Landsat 7 System*, March 1996

11. --, 423-41-55, *Interface Control Document Between the EOSDIS Core System (ECS) and the Level 1 Product Generation System*, October 1997

12. *Exploring Oracle DBMS*, "Parallel Processing Toolbox, Part 1," Vol. 2, No. 1, January 1997

13. "Concepts for ECS/LPGS I/F," A. Bernard, June 1997

1.4.2 Reference Documents

The following documents contain additional background information related to the Landsat 7 mission:

1. NASA/GSFC, *Landsat 7 Level 1 Requirements* (Draft), August 1994

2. AlliedSignal Technical Services Corporation (ATSC), *Landsat 7 Detailed Mission Requirements*, March 1996

3. NASA/GSFC, 430-11-06-003-0, *Landsat 7 System and Operations Concept*, October 1994

4. Martin Marietta Astro Space, CDRL No. A104, *Space Segment Calibration Plan*, August 1994

5. --, 23007702, *Landsat 7 System Data Format Control Book (DFCB) Volume 4—Wideband Data, Revision F*, May 1997

6. --, CDRL #A058, 23007610A, *Landsat-7 Program Coordinate System Standard, Revision B*, December 1994

7. United States Geological Survey (USGS)/National Oceanic and Atmospheric Administration (NOAA), *Index to Landsat 7 Worldwide Reference System (WRS)*, 1982

Section 2. All LPGS Subsystem Communications

The interprocess communication (IPC) between the LPGS subsystems occurs through the LPGS database, the Oracle Database Management System (DBMS) pipes, or script parameters. Which of these methods is used depends on the needs of the subsystem or task.

The LPGS subsystems and their tasks are shown in Table 2-1 to facilitate the discussion of the LPGS IPC.

Data communicated through the LPGS database are updated by one subsystem as part of processing and read by another subsystem based on a timer. For example, before a script to begin radiometric processing is initiated, PCS checks the database to make sure that the product request has not been canceled. An example of a timer polling the database for a value is the DXL task looking for a product_requests table state value of “shippable”. When DXL finds this value, it knows that the Level 1 (L1) products associated with this product request are ready for transmission to the Earth Observing System Data and Information System (EOSDIS) Core System (ECS).

The various LPGS subsystems use four major tables to communicate with each other: the product_requests, work_orders, anomalies, and wo_scripts tables. The product_requests table has five fields that are used by more than one subsystem: state, cancellation_status, delete_flag, promote_flag, and trending_data_xfer_flag. The work_orders table has two fields that are shared by several subsystems: state and priority. The anomalies table has one field that is shared: state. Table 2-2 indicates how these fields are initialized and updated as well as which tasks act on the specific field value.

Oracle DBMS pipes are used to send a specific message between the UI and a task. This is especially valuable in instances where timeliness is an issue. The Delete Product Request Files and Directories interface between the UI and DMS uses a pipe (see Section 4). The Delete Product Request Files and Directories interface is designed to allow the operator to request that certain files and directories be deleted immediately due to some disk problem. The pipe allows the message to get to DMS immediately.

UNIX script parameters are passed to scripts for script execution via an Object Descriptive Language (ODL) file. The ODL filename is passed to the script as an input parameter, and the script program accesses the file and reads the specific parameters needed for processing. The processing status is then returned to the caller as an exit status.

Table 2-1. LPGS Subsystems and Their Tasks

Subsystem	Tasks
Anomaly Analysis Subsystem (AAS)	None
Data Management Subsystem (DMS)	IF With ECS (DIE)
	Xmit L1 Product (DXL)
	Format L1 Product (DFL)
	Acquire Data (DAD)
	Ingest L0R Product (DIP)
	DAN Manager (DDM)
	Resource Manager (DRM)
	Generate Reports (DGR)
	Process L0R Products (DPL)
	User Ingest (DUI)
Geometric Processing Subsystem (GPS)	Thematic Initialization (TMINIT)
	Thematic Grid (TMGRID)
	Thematic Resampler (TMRESAMPLE)
Process Control Subsystem (PCS)	Schedule Work Orders (PWS)
	Generate Work Orders (PWG)
	Control Work Order Execution (PWC)
	Process System Initialization/Termination (PSI)
Quality Assessment Subsystem (QAS)	Perform L1R Quality Assessment (Q1R)
	Perform L1G Quality Assessment (Q1G)
Radiometric Processing Subsystem (RPS)	R0R
	R0C
	R1R
User Interface (UI)	None

Table 2-2. Database Fields Used for Interfacing Information (1 of 2)

Table	Field	Value	Set By	Read By	Interface Name
product_requests	state	prepending	DIE	PSI	ECS_Prod_Req Read for LPGS System Startup
		pending	DIE AAS/UI	DAD	ECS_Prod_Req AAS_Prod_Req (Recreate Product Request)
		L0R requested	DAD DIP	DIP DAD PSI	L0R_Ingest_Info Read for LPGS System Startup
		L0R ready	DIP	PWS	L0R_Data_Avail
		wo_gen	PWS		
		wo_ready	PWG		
		process	PWS		
		shippable	PWC	DXL	L1_Prod_Xfer_Req
		pdr generated	DXL	DXL	L1_Xmit_Info
		xferred	DXL		L1_Xmit_Info
		failed	AAS/UI		L1_Product_Fail (Fail Product)
		canceled	PWS PWC DAD		Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request)
	cancellation_ status	no	DIE		
		pending	UI	DAD PWS PWC	Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request)
		done	PWC PWS DAD		Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request)
	delete_flag	no	DIE		
		deletable	PWS PWC AAS/UI DXL DAD	DRM	Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request) L1_Product_Fail (Fail Product) Delete_Info
		deleted	DRM		Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request)
	promote_flag	false	DIE AAS/UI	PWS	ECS_Prod_Req AAS_Prod_Req (Recreate Product Request)
		true	UI	PWS DAD	Promote Product Request
	trending_data_ xfer_flag	not ready	DIE		
		ready	PWC	IAS	
		deletable	DAD PWC PWS AAS/UI IAS	DRM	Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request) L1_Product_Fail (Fail Product)

Table 2-2. Database Fields Used for Interfacing Information (2 of 2)

Table	Field	Value	Set By	Read By	Interface Name
		deleted	DRM		Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request)
work_orders	state	aas	AAS/UI		Diagnostic_WO_Req (Generate Work Order)
		pending	PWG AAS/UI	PWS	Set by PWG when work order is created Activate_WO_Req (Activate Work Order)
		executing	PWS	PSI	Read for LPGS System Startup
		halted	PWC	AAS/UI	
		V1R	PWC	QAS/UI	
		V1G	PWC	QAS/UI	
		VFP	PWC	QAS/UI	
		resumable	AAS/UI AAS/UI QAS/UI	PWS	L1_Product_Approval (Approve Distribution) Resume_WO_Req (Resume Work Order) Approve/Disapprove Visual Image
		failed	AAS/UI		L1_Product_Fail
		anomaly	PWC QAS/UI	 PSI	Unsuccessful script status Read for LPGS System Startup Approve/Disapprove Visual Image
		canceled	PWS PWC DAD AAS/UI	PWC	Cancel_Info, L1_Prod_Cancel_Req, (Cancel Product Request) Cancel Work Order (Cancel_WO_Req)
		ready to ship	PWC		Based on exit status from L1_Format_Status
	priority	false	AAS/UI PWG	PWS	Generate Work Order Set by PWG when initial work order is created
		true	AAS/UI	PWS	Activate Work Order
anomalies	state	pending	PWC QAS/UI	AAS	Anomaly_Req Approve/Disapprove Visual Image
		analysis	AAS/UI	AAS/UI	Anomaly_Recvd (Receive Anomaly)
		closed	AAS/UI	AAS/UI	Anomaly_Closed L1_Product_Fail (Fail Product) L1_Product_Approval (Approve Distribution)
wo_scripts	pause_flag	pause, no pause, V1R, V1G, VFP	AAS/UI	PWC	Modify_Pauses_Req (Modify Pauses)

2.1 PCS Internal

2.1.1 Generate Original Work Order

2.1.1.1 Description

The Generate Original Work Order interface requests that a work order be generated for a product request.

2.1.1.2 Format/Size

The format and size of the Generate Original Work Order interface are as follows:

Parameter	Type	Comment	Size (Bytes)
product_request_id	Character	Identifies product request that needs an original work order	20
visual_qa_needed	Character	Indicates whether visual quality analysis is to be performed on this work order	5

2.1.1.3 IPC Mechanism

PWS starts a PWG task and provides it with a product request identifier to which the work order will be associated. PWS also indicates if visual quality analysis is required for the new work order.

2.1.1.4 Frequency

This interface is activated each time a work order needs to be generated for nominal processing of a product request.

2.1.2 Generate Original Work Order Response

2.1.2.1 Description

The Generate Original Work Order Response interface provides the processing status from PWG to PWS, indicating whether the work order was generated successfully.

2.1.2.2 Format/Size

The format and size of the Generate Original Work Order Response interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.1.2.3 IPC Mechanism

A PWG task is started by a fork by PWS. When processing is complete, PWG returns an exit status to PWS.

2.1.2.4 Frequency

The contents of this interface are returned from PWG each time a new work order needs to be generated as part of nominal processing.

2.1.3 Control Work Order

2.1.3.1 Description

The Control Work Order interface requests that a work order be processed. This involves running the scripts identified for the work order.

2.1.3.2 Format/Size

The format and size of the Control Work Order interface are as follows:

Parameter	Type	Comment	Size (Bytes)
work_order_id	Character	Identifies the work order	7

2.1.3.3 IPC Mechanism

PWS starts a PWC task and provides it with a work order identifier that must be processed.

2.1.3.4 Frequency

This interface is activated each time there are sufficient resources to run a work order.

2.1.4 Control Work Order Response

2.1.4.1 Description

The Control Work Order Response interface provides the processing status from PWC to PWS, indicating whether the work order was processed successfully.

2.1.4.2 Format/Size

The format and size of the Control Work Order Response interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.1.4.3 IPC Mechanism

The PWC task is started by a fork by PWS. When processing is complete, PWC returns an exit status to PWS.

2.1.4.4 Frequency

The contents of this interface are returned from PWC each time there are sufficient resources to process a work order.

2.2 PCS and DMS

2.2.1 L0R_Ingest_Info

2.2.1.1 Description

The L0R_Ingest_Info interface provides the status information that DAD and DIP write to the product_requests table. The data include the intermediate states of the ingest process via the protocol_status and the final state when the L0R data are available for processing (i.e., L0R ready). DAD sets the state to "L0R requested", and DIP sets the state to "L0R ready".

2.2.1.2 Format/Size

The format and size of the L0R_Ingest_Info interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	state	value = L0R requested = L0R ready	2
	protocol_status	Values used internally by DIP and DAD to determine what part of protocol has been completed	2

2.2.1.3 IPC Mechanism

DAD and DIP update the state and the protocol_status fields in the product_requests table. DAD and DIP use the protocol_status internally; PWS acts on the "L0R ready" state, not the "L0R requested" state. However, L0R_Data_Avail, a subset of the L0R_Ingest_Info, is read by PWS.

Write	Read
DAD, DIP	PWS, DAD, DIP

2.2.1.4 Frequency

The product_requests table is updated by DAD and DIP each time the protocol_status of the ingest changes, when the L0R product is requested, and when the L0R product is available for processing.

2.2.2 L0R_Data_Avail

2.2.2.1 Description

The L0R_Data_Avail interface notifies PWS that L0R data are available for a product request and, therefore, PWS can start its processing of the product request (i.e., generate a work order).

NOTE: This interface is a subset of the L0R_Ingest_Info interface.

2.2.2.2 Format/Size

The format and size of the L0R_Data_Avail interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	state	value = L0R ready	2

2.2.2.3 IPC Mechanism

DIP updates the product_requests table, and PWS reads the table.

Write	Read
DIP	PWS

2.2.2.4 Frequency

This interface is invoked each time DIP receives L0R data and completes placing the data in the appropriate directories.

2.2.3 L0R_Stats_Req

2.2.3.1 Description

The L0R_Stats_Req interface notifies DPL that a Level 0 radiometrically corrected (L0R) product that has been ingested into the LPGS requires analysis before it can be used in a work order. The L0R product must be validated and consensus payload correction data (PCD) and consensus mirror scan correction data (MSCD) files must be generated.

2.2.3.2 Format/Size

The format and size of the L0R_Stats_Req interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the L0R_Stats_Req ODL file is as follows:

Parameter	Type	Comment
product_request_id	Character	Identifies product request that must be processed
work_order_id	Character	Identifies work order that must be processed
script_name	Character	Identifies script being processed
l0r_hdfname	Character	Identifies full path to L0R image and files
l0r_id	Character	Unique L0R identifier used for trending
wo_directory	Character	Identifies full path to work order directory

2.2.3.3 IPC Mechanism

The parameters are packaged in an ODL file. The ODL filename is passed to DPL from PWC as a calling parameter through the script that invokes this process.

2.2.3.4 Frequency

Before an L0R product is used in a work order, PWC activates this interface to command DPL to perform data validation and to create the consensus PCD and MSCD files.

2.2.4 L0R_Stats_Status

2.2.4.1 Description

The L0R_Stats_Status interface provides the processing status from DPL to PWC indicating whether the results of the L0R product validation were successful and whether the consensus PCD and MSCD files have been generated successfully.

2.2.4.2 Format/Size

The format and size of the L0R_Stats_Status interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.2.4.3 IPC Mechanism

The L0R product preprocessing performed by DPL is started as a script by PWC. When this process exits, it returns an exit status to PWC. The contents of the L0R_Stats_Status interface are returned in the DPL process exit status.

2.2.4.4 Frequency

The contents of this interface are returned from DPL each time preprocessing of an L0R product has been completed.

2.2.5 L1_Format_Req

2.2.5.1 Description

The L1_Format_Req interface requests that DFL format an L1 product prior to its transfer to the ECS. DFL packages the L1 product and moves it to an output staging directory in preparation for delivery to the ECS.

2.2.5.2 Format/Size

The format and size of the L1_Format_Req interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the L1_Format_Req ODL file is as follows:

Parameter	Type	Comment
product_request_id	Character	Identifies product request image that needs to be formatted
work_order_id	Character	Identifies work order that must be processed
script_name	Character	Identifies script being processed
l0r_hdfname	Character	Identifies full path to the L0R image and files
l0r_id	Character	Unique L0R identifier used for trending
wo_directory	Character	Identifies full path to work order directory

2.2.5.3 IPC Mechanism

Parameters required for formatting the L1 product are placed in an ODL file by PWC. When PWC starts the DFL script, it passes the ODL filename as an input parameter to the script.

2.2.5.4 Frequency

Before delivery of an L1 product, PWC activates this interface to command DFL to format both image and non-image data, package the L1 product, and place the product in the output staging directory.

2.2.6 L1_Format_Status

2.2.6.1 Description

The L1_Format_Status interface provides the processing status from DFL to PWC regarding the formatting of the L1 product and its movement to a delivery directory.

2.2.6.2 Format/Size

The format and size of the L1_Format_Status interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.2.6.3 IPC Mechanism

The L1 formatting performed by DFL is started as a script by PWC. When the process exits, it returns an exit status to PWC. The contents of the L1_Format_Status interface are returned in the DFL process exit status.

2.2.6.4 Frequency

The contents of the L1_Format_Status interface are returned from DFL each time an L1 product has been formatted and staged.

2.2.7 L1_Prod_Xfer_Req

2.2.7.1 Description

The L1_Prod_Xfer_Req interface notifies DXL that an L1 product is ready to be transmitted to the ECS.

2.2.7.2 Format/Size

The format and size of the L1_Prod_Xfer_Req interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	state	value = shippable	2

2.2.7.3 IPC Mechanism

PWC updates the database with the data. DXL periodically checks the product_requests state in the database.

Write	Read
PWC	DXL

2.2.7.4 Frequency

PWC sets the state to “shippable” when the work order processing completes successfully. DXL periodically polls the database for L1 products ready for transmission to the ECS. DXL initiates the transfer of the product when an L1 product state value indicates that the product is “shippable”.

2.3 DMS Internal

2.3.1 ECS_Prod_Req

2.3.1.1 Description

The ECS_Prod_Req interface contains the product request that was provided by the ECS. DIE inserts the request in the product_requests table and sets the state to “prepending”. After DIE completes its processing of the product request, DIE updates the state to “pending”.

2.3.1.2 Format/Size

The format and size of the ECS_Prod_Req interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	whole table row	state = prepending = pending	~450

2.3.1.3 IPC Mechanism

DIE inserts the product request into the product_requests table. DAD reads the table, looking for a state of “pending” as an indicator that it should request Level 0 (L0) data from the ECS for the product request.

Write	Read
DIE	DAD

2.3.1.4 Frequency

This interface is invoked each time LPGS gets a new user request file (URF) from the ECS.

2.3.2 L1_Xmit_Info

2.3.2.1 Description

The L1_Xmit_Info interface information is used to keep track of the L1 product's shipping state. The product_requests table is updated when the product delivery record (PDR) has been generated for a product request and then again when the L1 products have been transferred successfully to the ECS.

2.3.2.2 Format/Size

The format and size of the L1_Xmit_Info interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	state	value = pdr generated = xferred	2

2.3.2.3 IPC Mechanism

DXL updates the state at the intermediate point and then again when the product has been shipped. The final state of "xferred" is subsequently used for reporting purposes.

Write	Read
DXL	DXL

2.3.2.4 Frequency

This interface is invoked each time DXL generates a PDR and each time DXL completes the shipment of L1 products.

2.3.3 DIP_Info

2.3.3.1 Description

The DIP_Info interface notifies DIP that the L0R product is available for ingest from the ECS. DIP then transfers the L0R product from the ECS to the LPGS and notifies the ECS of the status of the ingest.

2.3.3.2 Format/Size

The format and size of the DIP_Info interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the DIP_Info ODL file is as follows:

Parameter	Type	Comment
product_request_id	Character	Identifies product request that DIP must process
dan_msg	Structure	DAN message received from ECS

2.3.3.3 IPC Mechanism

The parameters are packaged in an ODL file. The ODL filename is passed to DIP from DDM as a calling parameter through the script that invokes this process.

2.3.3.4 Frequency

DDM activates this interface to command DIP to perform data ingest when DDM receives a data availability notice (DAN) from the ECS.

2.3.4 DIP_Status

2.3.4.1 Description

The DIP_Status interface provides the processing status from DIP to DDM indicating whether the results of the L0R product ingest were successful.

2.3.4.2 Format/Size

The format and size of the DIP_Status interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.3.4.3 IPC Mechanism

The L0R ingest processing performed by DIP is started as a script by DDM. When this process exits, it returns an exit status to DDM. The contents of the DIP_Status interface are returned in the DIP process exit status.

2.3.4.4 Frequency

The contents of this interface are returned from DIP each time the ingest of an L0R product has been completed.

2.3.5 Delete_Info (DXL to DRM)

2.3.5.1 Description

The Delete_Info interface is used in nominal processing by DXL to notify DRM that delivery of an L1 product to the ECS has completed successfully and, therefore, the files associated with this product request can be deleted. DRM reads the delete_flag from the database and proceeds to delete the designated product request data.

2.3.5.2 Format/Size

The format and size of the Delete_Info (DXL to DRM) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	delete_flag	value = deletable	1

2.3.5.3 IPC Mechanism

DXL updates the delete_flag in the database. DRM periodically checks the value of the delete_flag in the database. When DRM finds the delete_flag set to “deletable”, it deletes the files and directories, then updates the delete_flag to “deleted”.

Write	Read
DXL	DRM

2.3.5.4 Frequency

The delete_flag in the product_requests table is set by DXL for each L1 product after it has been sent successfully to the ECS. DRM periodically polls the database for the delete_flag to determine which products can be deleted. After each successful deletion of a product request, DRM updates the product_requests table’s delete_flag to indicate the products were deleted.

2.4 AAS and PCS

2.4.1 Anomaly_Req

2.4.1.1 Description

The Anomaly_Req interface informs AAS that a new anomaly exists in the system. The anomaly is detected by a QAS, DMS, RPS, or GPS script, which informs PWC by an exit status to a script. PWC then updates the work_orders and anomalies tables to indicate the existence of the new anomaly.

2.4.1.2 Format/Size

The format and size of the Anomaly_Req interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = anomaly	2
anomalies	product_request_id	value = product request ID	20
	anomaly_id	value = serial ID assigned by database	6
	origin	value = internal	2
	date_entered	value = current date and time	21
	state	value = pending	1
	current_wo_id	value = work order ID	7
	title	value = script xxx failed	80

2.4.1.3 IPC Mechanism

PWC updates the work_orders and anomalies tables. AAS reads the anomalies table looking for a status of “pending”.

Write	Read
PWC	AAS

2.4.1.4 Frequency

The contents of this interface are updated by PWC each time a script returns an unsuccessful exit status.

2.5 QAS and PCS

2.5.1 Q1R_Proc_Req

2.5.1.1 Description

The Q1R_Proc_Req interface allows PWC to request Q1R to perform the automated image quality assessment on the L1 radiometrically corrected (L1R) image. PWC invokes Q1R and passes the ODL filename as an input parameter to the UNIX script. The ODL file contains values required to perform the automated image quality assessment.

2.5.1.2 Format/Size

The format and size of the Q1R_Proc_Req interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the Q1R_Proc_Req ODL file is as follows:

Parameter	Type	Comment
script_name	Character	Identifies script being processed
work_order_id	Character	Identifies work order being processed
product_request_id	Character	Identifies product request being processed
l0r_id	Character	Unique L0R identifier used for trending
l0r_hdfname	Character	Identifies full path to L0R image and files
DL_thres	Character	Number of filled major frames
DL_part_thres	Character	Number of filled partial major frames
PCD_fill_thres	Character	Number of filled PCD major frames
wo_directory	Character	Identifies full path to work order directory

2.5.1.3 IPC Mechanism

The automated image quality assessment of the L1R image is started as a script by PWC. The script receives an ODL filename as an input parameter. Q1R processing accesses the parameters in the file.

2.5.1.4 Frequency

The contents of this interface are sent to Q1R from PWC for every work order producing an L1R product.

2.5.2 Q1R_Proc_Status

2.5.2.1 Description

The Q1R_Proc_Status interface provides the processing status to PWC regarding the image quality assessment of the L1R image.

2.5.2.2 Format/Size

The format and size of the Q1R_Proc_Status interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of the process	2

2.5.2.3 IPC Mechanism

The automated image quality assessment of the L1R image is started as a script by PWC. When the Q1R process exits, the software returns an exit status to PWC. If an image fails the quality assessment, Q1R sets a flag in the QAS_results table.

2.5.2.4 Frequency

The contents of this interface are sent to PWC from Q1R on completion of L1 automated image quality assessment each time a work order is processed for an L1R product.

2.5.3 Q1G_Proc_Req

2.5.3.1 Description

The Q1G_Proc_Req interface allows PWC to request Q1G to perform the automated image quality assessment on the L1 geometrically corrected (L1G) image. PWC invokes Q1G and passes the ODL filename as an input parameter to the UNIX script. The ODL file contains values required to perform the automated image quality assessment.

2.5.3.2 Format/Size

The format and size of the Q1G_Proc_Req interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The contents of the Q1G_Proc_Req ODL file is as follows:

Parameter	Type	Comment
script_name	Character	Identifies script being processed
work_order_id	Character	Identifies work order being processed
product_request_id	Character	Identifies product request being processed
l0r_id	Character	Unique L0R identifier used for trending
l0r_hdfname	Character	Identifies full path to L0R image and files
bad_eph_thres	Character	Ephemeris data threshold
bad_semi_thres	Character	Semi-major data threshold
bad_incl_thres	Character	Inclination data threshold
bad_ang_thres	Character	Angular momentum data threshold
bad_epa1_thres	Character	Euler point 1 data threshold
bad_epa2_thres	Character	Euler point 2 data threshold
bad_epa3_thres	Character	Euler point 3 data threshold
bad_epa4_thres	Character	Euler point 4 data threshold
Vbad_groll_thres	Character	Gyro roll data threshold
bad_gpitch_thres	Character	Gyro pitch data threshold
bad_gyaw_thres	Character	Gyro yaw data threshold
bad_gdroll_thres	Character	Gyro drift roll data threshold
bad_gdpitch_thres	Character	Gyro drift pitch threshold
bad_gdyaw_thres	Character	Gyro drift yaw data threshold
std_delta_aroll_thres	Character	ADS roll data threshold
std_delta_apitch_thres	Character	ADS pitch data threshold
std_delta_ayaw_thres	Character	ADS yaw data threshold
wo_directory	Character	Identifies full path to work order directory

2.5.3.3 IPC Mechanism

The automated image quality assessment of the L1G image is started as a script by PWC. The script receives an ODL filename as an input parameter. Q1G processing accesses the parameters in the file.

2.5.3.4 Frequency

The contents of this interface are sent to Q1G from PWC for every work order producing an L1G product.

2.5.4 Q1G_Proc_Status

2.5.4.1 Description

The Q1G_Proc_Status interface provides the processing status to PWC regarding the image quality assessment of the L1G image.

2.5.4.2 Format/Size

The format and size of the Q1G_Proc_Status interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.5.4.3 IPC Mechanism

The automated quality image assessment of the L1G image is started as a script by PWC. When the Q1G process exits, the software returns an exit status to PWC. If an image fails the quality assessment, Q1G sets a flag in the QAS_results table.

2.5.4.4 Frequency

The contents of this interface are sent to PCS from Q1G on completion of L1 automated image quality assessment each time a work order is processed for an L1G product.

2.6 PCS and RPS

The RPS provides radiometric correction of the L0R image. An RPS script starts each RPS program. PWC starts all RPS scripts as part of work order execution. As each RPS script terminates, PWC retrieves the exit status and reports it to the LPGS database.

2.6.1 Proc_Parms (Radiometric)

2.6.1.1 Description

The Proc_Parms interface contains processing parameters for radiometric characterization and generation of the L1R image. PWC retrieves these parameter values from the LPGS database and builds an ODL parameter file. PWC passes the ODL parameter filename to RPS during the fork/exec of the RPS script. PWC also provides an environment variable containing the work order identifier to the RPS.

2.6.1.2 Format/Size

The format and size of the Proc_Parms (radiometric) interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the Proc_Parms (radiometric) ODL file is as follows:

Parameter	Type	Comment
Global		
SCRIPT_NAME	25 char	Script name used to tag status/error reporting
LOR_ID	9 char	Unique L0R identifier used for trending
WORK_ORDER_ID	Character	Identifies work order
WO_DIRECTORY	256 char	Work order directory path
PRODUCT_REQUEST_ID	Character	Identifies product request image that needs to be formatted
L0R_HDFNAME	256 char	Input L0R product path
CAL_PARM_FILE	256 char	LPGS leaves this parameter out and uses the L0R CPF
R0R		
BAND_LIST	9 integers	Bands to be processed (1, 2, 3, 4, 5, 61, 62, 7, 8)
SCENE_TYPE	integer	Identifies the type of scene being processed: 0 = day (only choice for LPGS) 1 = night
SAVE_TRENDING	integer	Specifies whether trending data should be saved to the database: 0 = no 1 = yes (only choice for LPGS)
CHAR_RN	integer	Specifies whether random noise should be characterized: 0 = no (only choice for LPGS) 1 = yes
CAL_PARM_SEL	integer	Specifies whether prelaunch, postlaunch, or current launch calibration parameter file (CPF) parameter values are to be used: 0 = current 1 = prelaunch 2 = postlaunch
CHAR_AD_STAT	integer	Specifies whether A/D saturations should be characterized: 0 = no (only choice for LPGS) 1 = yes
CHAR_CN	integer	Specifies whether coherent noise should be characterized: 0 = no (only choice for LPGS) 1 = yes
CHAR_IN	integer	Specifies whether impulse noise should be characterized: 0 = no 1 = yes (only choice for LPGS)
CHAR_ME	integer	Specifies whether memory effect should be characterized: 0 = no (only choice for LPGS) 1 = yes
CHAR_SCS	integer	Specifies whether scan correlated shift should be characterized: 0 = no 1 = yes (only choice for LPGS)
CORR_CN	integer	Specifies whether coherent noise should be corrected: 0 = no 1 = yes (only choice for LPGS)

Parameter	Type	Comment
CORR_ME	integer	Specifies whether memory effect should be corrected: 0 = no 1 = yes (only choice for LPGS)
CORR_SCS	integer	Specifies whether scan correlated shift should be corrected: 0 = no 1 = yes (only choice for LPGS)
R0C		
BAND_LIST	9 integers	Bands to be processed (1, 2, 3, 4, 5, 61, 62, 7, 8)
SCENE_TYPE	Integer	Identifies the type of scene being processed: 0 = day (only choice for LPGS) 1 = night
SAVE_TRENDING	integer	Specifies whether trending data should be saved to the database: 0 = no 1 = yes (only choice for LPGS)
CHAR_RN	integer	Specifies whether random noise should be characterized: 0 = no (only choice for LPGS) 1 = yes
CAL_PARM_SEL	integer	Specifies whether prelaunch, postlaunch, or current launch CPF parameter values are to be used: 0 = current 1 = prelaunch 2 = postlaunch
GAIN_SOURCE	integer	Identifies the source of the gains to be applied for the product being processed: 0 = IC, for gains derived from processing this product's internal calibrator (IC) data 1 = CPF, for gains extracted from a CPF (only choice for LPGS)
APPLY_RELGAINS	integer	Specifies whether relative gains are to be applied: 0 = no (default value) 1 = yes
APPLY_TEMPCORR	integer	Specifies whether temperature corrections are to be applied: 0 = no (default value) 1 = yes
CHAR_ANALOG_STAT	integer	Specifies whether analog saturation should be characterized: 0 = no (only choice for LPGS) 1 = yes
R1R		
BAND_LIST	9 integers	Bands to be processed (1, 2, 3, 4, 5, 61, 62, 7, 8)
SCENE_TYPE	integer	Identifies the type of scene being processed: 0 day (only choice for LPGS) 1 = night

Parameter	Type	Comment
SAVE_TRENDING	integer	Specifies whether trending data should be saved to the database. 0 = no 1 = yes (only choice for LPGS)
CHAR_RN	integer	Specifies whether random noise should be characterized: 0 = no (only choice for LPGS) 1 = yes
CAL_PARM_SEL	integer	Specifies whether prelaunch, postlaunch, or current launch CPF parameter values are to be used: 0 = current 1 = prelaunch 2 = postlaunch
BAND_THRESHOLD	float	Specifies threshold to be used in detecting the banding artifact
CHAR_BANDING	integer	Specifies whether banding should be characterized: 0 = no (default value) 1 = yes Value selected here must be identical to CORR_BANDING
CORR_BANDING	integer	Specifies whether banding corrections should be applied: 0 = no (default value) 1 = yes Value selected here must be identical to CHAR_BANDING
CORR_INOPDET	integer	Specifies whether inoperable detector correction should be performed: 0 = none (default value) 1 = interpolate 2 = substitute (if selected, must provide FILL_INOPDET value)
CORR_MAJOR_FRAME	integer	Specifies whether dropped major frames (entire scan) should be corrected: 0 = none (default value) 1 = interpolate 2 = substitute (if selected, must provide FILL_VALUE value)
CORR_MINOR_FRAME	integer	Specifies whether dropped minor frames should be corrected: 0 = none (default value) 1 = interpolate 2 = substitute (if selected, must provide FILL_VALUE value)
CORR_STRIPING	integer	Specifies whether striping corrections should be applied: 0 = no (default value) 1 = yes
FILL_INOPDET	integer	Specifies fill value to be substituted for inoperable detectors (must be present if CORR_INOPDET is selected)

Parameter	Type	Comment
FILL_VALUE	integer	Specifies fill value to be substituted for dropped major or minor frames (must be present if CORR_MAJOR_FRAME or CORR_MINOR_FRAME is selected)
SAVE_DIFFIM	integer	Specifies whether banding difference immage is to be stored: 0 = no (only choice for LPGS) 1 = yes
SAVE_GBFOM	integer	Specifies whether global banding figure of merit is to be stored to trending database: 0 = no (only choice for LPGS) 1 = yes

2.6.1.3 IPC Mechanism

RPS parameters are passed via an ODL file. PWC builds the ODL file and passes the ODL filename to RPS as a command line argument.

2.6.1.4 Frequency

The contents of this interface are sent to RPS from PWC each time a radiometric script is invoked.

2.6.2 Proc_Status (Radiometric)

2.6.2.1 Description

PWC is the parent of all RPS scripts. When the RPS script exits, the software returns the exit status to PWC.

2.6.2.2 Format/Size

The format and size of the Proc_Status (radiometric) interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates sucess or failure of process	2

2.6.2.3 IPC Mechanism

The radiometric processing performed by RPS is started as a script by PWC. When the RPS process exits, the software returns the process exit status to PWC. The Proc_Status is returned in the process exit status.

2.6.2.4 Frequency

The contents of this interface are sent to PWC from RPS each time a radiometric script is completed.

2.7 PCS and GPS

The GPS provides geometric correction of the L0R image. A GPS script starts each GPS program. PWC starts all GPS scripts as part of work order execution. As each GPS script terminates, PWC retrieves the exit status and reports it to the LPGS database.

2.7.1 Proc_Parms (Geometric)

2.7.1.1 Description

The Proc_Parms interface contains processing parameters to perform L1G processing and geometric characterization. PWC retrieves these parameter values from the LPGS database and builds an ODL parameter file. PWC passes the ODL parameter filename to GPS during the fork/exec of the GPS script. PWC also provides an environment variable containing the work order identifier to the GPS.

2.7.1.2 Format/Size

The format and size of the Proc_Parms (geometric) interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the Proc_Parms (geometric) ODL file is as follows:

Parameter	Type	Comment
Global		
L0R_HDFNAME	256 char	Input L0R product path
PRODUCT_REQUEST_ID	Character	Identifies product request image that needs to be formatted
SCRIPT_NAME	25 char	Script name used to tag status/error reporting
L0R_ID	9 char	Unique L0R identifier used for trending
WORK_ORDER_ID	Character	Identifies work order
WO_DIRECTORY	256 char	Work order directory path
CAL_PARM_FILE	256 char	LPGS leaves this parameter out and uses the L0R CPF
FDF_NAME	256 char	LPGS leaves this out and uses PCD ephemeris
SCRIPT_NAME	32 char	Script name used to tag status/error reporting

Parameter	Type	Comment
TMINIT		
META_OPT	1 long	Option to validate the metadata: 0 = off (default) 1 = on
TMODEL_FILE_NAME	256 char	Output ETM+ model filename; default is “etmodel.stm”
TMGRID		
L1R_IMAGE	256char	Input L0R or L1R image for which grid is to be generated
TMODEL_FILE_NAME	256 char	Input ETM+ model file; default is “etmodel.stm”
GRID_FILE_NAME	256 char	Output grid filename; default is “etmgrid.sgrd”
PROJ_CODE	1 long	Projection code: 1 = Universal Transverse Mercator (UTM) 4 = Lambert Conformal Conic (LCC) 6 = Polar Stereographic (PS) 7 = Polyconic (PC) 9 = Transverse Mercator (TM) 20 = Oblique Mercator (OM) 22 = Space Oblique Mercator (SOM)
UTM_ZONE	1 long	UTM zone code: 1 to 60 = northern hemisphere -1 to -60 = southern hemisphere
PROJ_PARMS	15 double	Projection definition information. Content varies by projection (not used for UTM and SOM, for which the projection is completely defined by UTM_ZONE and PATH_WRS, respectively)
PROJ_UNITS	12 char	Units of projection distances (meters, feet, seconds, degrees, radians)
PIXEL_SIZE	3 double	Output pixel size: one value for bands 1 - 5 and 7, one value for band 6, and one value for band 8
BAND_LIST	9 long	Band numbers to process
FRAME_TYPE	1 long	Framing option: 1 = User specifies UL and LR latitude/longitude coordinates (FRAME_COORDS[1]) 2 = User specifies LR output projection coordinates (FRAME_COORDS[2]). The user also specifies another point in output projection space (FRAME_COORDS[1]), along with its corresponding line/sample in image space (LSCOORDS) (not used by LPGS) 3 = User specifies UL output projection coordinate (FRAME_COORDS[1]) and the number of lines (NLINES) and samples (NSAMPS) in output space (not used by LPGS) 4 = Min-box framing (minimum bounding rectangle) 5 = Path-oriented (standard) framing (specify PATH_WRS and ROW_WRS parameters)
FRAME_COORDS	2x2 double	Frame coordinates that define output space. Depends on value of FRAME_TYPE parameter (either UL and LR corners, reference point and LR corner, or UL corner)

Parameter	Type	Comment
COORD_UNITS	12 char	Units of FRAME_COORDS; defaults to degrees
LSCOORDS	2 double	Line/sample coordinates (used when FRAME_TYPE = 2) (not used by LPGS)
NLINES	3 long	Number of lines in output space (used when FRAME_TYPE = 3); one value for bands 1 - 5 and 7, one value for band 6, and one value for band 8 (not used by LPGS)
NSAMPS	3 long	Number of samples in output space (used when FRAME_TYPE = 3): one value for bands 1 - 5 and 7, one value for band 6, and one value for band 8 (not used by LPGS)
PATH_WRS	1 long	WRS path number. Used for constructing standard path-oriented frame when FRAME_TYPE = 5. Also used when PROJ_CODE = 22 (SOM)
ROW_WRS	1 double	WRS row number (may be fractional). Used for constructing standard path-oriented frame when FRAME_TYPE = 5
TMRESAMPLE		
L1R_IMAGE	256 char	Input L1R or L0R image filename to be resampled
BAND_LIST	9 long	Bands to process
L1G_IMAGE	256 char	Output image filename. This will be the output hierarchical data format (HDF) name. Band files will be created as associated external files
INPUT_GRID	256 char	Input grid filename. Default is “etmgrid.sgrd”
TERRAIN_FLAG	1 long	Flag to apply terrain correction: 0 = no (always) 1 = yes
IN_DEM_NAME	256 char	Input digital elevation model (DEM) image filename (co-registered) (if TERRAIN_FLAG = 1). Can set to null string or leave out
TERR_TBL_FLAG	1 long	Flag to read or calculate table of terrain offsets (if TERRAIN_FLAG = 1): 0 = calculate 1 = read Can set to 0 or leave out
TERR_TBL_NAME	256 char	Name of optional input terrain table (elevation offsets file) (if TERR_TBL_FLAG = 1). Can set to null string or leave out
DELAY_FLAG	1 long	Flag to apply detector delays: 0 = off 1 = on (always)
ODTYPE	4 char	Output data type (BYTE, I*2, I*4, R*4). Always BYTE
EXT_FLAG	1 long	Flag to save the extended image: 0 = no (always) 1 = yes
OUT_EXT_NAME	256 char	Output extended image filename (optional). Can set to null string or leave out
WINDOW_FLAG	1 long	Output window option flag: 0 = no (always) 1 = yes

Parameter	Type	Comment
WINDOW	4 long	Output window (sl, ss, nl, ns). Always (0,0,0,0)
RESAMPLE	3 char	Resampling method: NN = nearest neighbor CC = cubic convolution MTF = modulation transfer function
MINMAX_OUTPUT_DN	2 float	Minimum and maximum output values (used to limit output range for nonbyte output)
PCCALPHA	1 float	Parametric cubic convolution alpha parameter; default is -0.5
BACKGRND	1 float	Gray level fill value outside input image
TREND_FLAG	1 long	Scan gap statistics flag to switch trending on or off. This should be 0 (off) for LPGS

2.7.1.3 IPC Mechanism

GPS parameters are passed via an ODL file. PWC builds the ODL file and passes the ODL filename to GPS as a command line argument.

2.7.1.4 Frequency

The contents of this interface are sent to GPS from PWC each time a geometric script is invoked.

2.7.2 Proc_Status (Geometric)

2.7.2.1 Description

PWC is the parent of all GPS scripts. When the GPS script exits, software returns the exit status to PWC.

2.7.2.2 Format/Size

The format and size of the Proc_Status (geometric) interface are as follows:

Parameter	Type	Comment	Size (Bytes)
exit status	Integer	Indicates success or failure of process	2

2.7.2.3 IPC Mechanism

The geometric processing performed by GPS is started as a script by PWC. When the GPS process exits, the software returns the process exit status to PWC. The Proc_Status is returned in the process exit status.

2.7.2.4 Frequency

The contents of this interface are sent to PWC from GPS each time a geometric script is completed.

Section 3. RPS and GPS

3.1 Lev_1R_Image

3.1.1 Description

RPS and GPS do not communicate with each other directly. RPS generates images and calibration data files, which GPS needs to access. For the two subsystems to be able to access these files, the name of an intermediate or final output file is derived from the L0R HDF header file. The "name root" is derived from the header filename by eliminating the leading path information and the trailing extension. Thus, a name root is in the form "L7xsssfnYYDOYHHuuv". The remainder of the name is constructed as follows:

NameRoot_xxx.yyy

where xxx = B10, B20, B30, B40, B50, B6L, B6H, B70, and B81 for image files

C10, C20, C30, C40, C50, C6L, C6H, C70, and C81 for CAL files

yyy = 0Rc for 0R corrected data (output from R0R)

1R for radiometrically (but not cosmetically) corrected data (output from R0C)

1Rc for radiometrically and cosmetically corrected data (output from R1R)

Both RPS and GPS use the above method to construct filenames based on the root name, L0R HDF header file data structure name. This name is referred to as universal_reference in the product_requests table.

3.1.2 Format/Size

The format and size of the Lev_1R_Image interface are as follows:

Parameter	Type	Comment	Size (Bytes)
odl_filename	Character	Fully qualifies location of ODL file	256

The format of the Lev_1R_Image ODL file is as follows:

Parameter	Type	Comment
universal_reference	Character	"name root" from which various file names can be generated

3.1.3 IPC Mechanism

The ODL filename contains the universal_reference identifier. GPS uses this identifier to generate the specific identifiers it needs.

3.1.4 Frequency

The image data can be generated during each work order execution. LPGS expects to process 25 work orders per day.

Section 4. User Interface

This section addresses the interface between the user and the LPGS subsystems. Most of the interfaces identified in this section are through the database or the Oracle pipes; however, some of the interfaces simply invoke commercial off-the-shelf (COTS) software.

Additional information regarding the user interface can be found in the *LPGS User's Guide* (Reference 1) as well as in the *LPGS Detailed Design Specification* (Reference 2).

4.1 AAS/UI and PCS

4.1.1 Generate Work Order (Diagnostic_WO_Req)

4.1.1.1 Description

This interface allows the AAS analyst to generate a work order to solve an anomaly. The new work order is always based on an existing work order.

4.1.1.2 Format/Size

The format and size of the Generate Work Order (Diagnostic_WO_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	whole table row	state = aas	~344

4.1.1.3 IPC Mechanism

A set of screens is provided from which the AAS analyst can select an existing work order, modify it, and save it as a new work order.

The AAS analyst populates the Generate Work Order screen with the desired values and parameters. After the new work order is generated, AAS adds a new row to the work_orders table. PCS reads the work_orders table but does not actually schedule this work order until the analyst updates the state to "pending" via the Activate Work Order selection from the Work Order Information screen.

Write	Read
AAS/UI	

4.1.1.4 Frequency

This interface is invoked each time the AAS analyst needs to generate a work order to analyze an anomaly.

4.1.2 Cancel Work Order (Cancel_WO_Req)

4.1.2.1 Description

This interface allows the AAS analyst to cancel a work order that is being processed for analysis.

4.1.2.2 Format/Size

The format and size of the Cancel Work Order (Cancel_WO_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = canceled	2

4.1.2.3 IPC Mechanism

A screen is provided from which the AAS analyst can select an existing work order and cancel it. PWC reads the work_orders table.

Write	Read
AAS/UI	PWC

4.1.2.4 Frequency

This interface is invoked each time the AAS analyst needs to cancel a work order.

4.1.3 Activate Work Order (Activate_WO_Req)

4.1.3.1 Description

This interface allows the AAS analyst to activate a work order that has been generated for analysis. When the work order was generated, it had a state of “aas” in the work_orders table. This interface changes the state to “pending”. The priority is set to “true” so that this work order will be processed before new work orders because the product request associated with the work order has been in the processing queue for a longer period of time.

4.1.3.2 Format/Size

The format and size of the Activate Work Order (Activate_WO_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = pending	2
	priority	value = true	1

4.1.3.3 IPC Mechanism

A screen is provided from which the AAS analyst can activate a work order from the “aas” state. PWS reads the work_orders table.

Write	Read
AAS/UI	PWS

4.1.3.4 Frequency

This interface is invoked each time the AAS analyst is ready to run an AAS-created work order.

4.1.4 Resume Work Order (Resume_WO_Req)

4.1.4.1 Description

This interface allows the AAS analyst to resume a work order after a halt. This changes the state of the work order from “halted” to “resumable”.

4.1.4.2 Format/Size

The format and size of the Resume Work Order (Resume_WO_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = resumable	2

4.1.4.3 IPC Mechanism

A screen is provided from which the AAS analyst can resume a halted work order. PWS reads the work_orders table.

Write	Read
AAS/UI	PWS

4.1.4.4 Frequency

This interface is invoked each time the AAS analyst needs to resume a work order after it has been halted.

4.1.5 Modify Pauses (Modify_Pauses_Req)

4.1.5.1 Description

This interface allows the AAS analyst to either delete or add pauses to a work order. This can be done either before or after the work order is activated. However, only scripts that have not been started can have their pauses modified.

4.1.5.2 Format/Size

The format and size of the Modify Pauses (Modify_Pauses_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
wo_scripts	pause_flag	value = pause, no pause, V1R, V1G, VFP	1

4.1.5.3 IPC Mechanism

A screen is provided from which the AAS analyst can modify the pauses for a work order. PWC reads the wo_scripts table.

Write	Read
AAS/UI	PWC

4.1.5.4 Frequency

This interface is invoked each time the AAS analyst needs to modify the pauses in a work order.

4.1.6 Fail Product (L1_Product_Fail)

4.1.6.1 Description

This interface allows the AAS analyst to show that a product request cannot be processed successfully.

4.1.6.2 Format/Size

The format and size of the Fail Product (L1_Product_Fail) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	state	value = failed	2
	delete_flag	value = deletable	1
	trending_data_xfer_flag	value = deletable	1
anomalies	state	value = closed	1

4.1.6.3 IPC Mechanism

A screen is provided from which the AAS analyst can select a product request and mark it as failed. The analyst can optionally, through the UI, save related files to a designated area or tape. Then, AAS marks all associated files for deletion and closes the anomaly.

The ECS will not be notified of a product request that cannot be processed via the regular path (i.e., the DMS). Instead, it will be notified via a trouble ticket and e-mail or by phone communications.

Write	Read
AAS/UI	DRM

4.1.6.4 Frequency

This interface is invoked each time the AAS analyst needs to show that a product request cannot be processed successfully.

4.1.7 Approve Distribution (L1_Product_Approval)

4.1.7.1 Description

This interface allows the AAS analyst to approve the distribution of an L1 product that has been generated successfully during the analysis of a processing problem encountered by the LPGS.

4.1.7.2 Format/Size

The format and size of the Approve Distribution (L1_Product_Approval) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = resumable	2
anomalies	state	value = closed	1

4.1.7.3 IPC Mechanism

A screen is provided from which the AAS analyst approves an L1 product for distribution.

Write	Read
AAS/UI	PWS

4.1.7.4 Frequency

This interface is invoked each time an AAS analyst needs to approve an L1 product for distribution to the ECS as a result of anomaly analysis.

4.2 AAS Internal

4.2.1 Receive Anomaly (Anomaly_Recvd)

4.2.1.1 Description

This interface allows the AAS analyst to assign his/her name to an anomaly in the anomalies table. The first time that the analyst enters his/her name into the assignee field the state of the anomaly is changed from “pending” to “analysis”.

4.2.1.2 Format/Size

The format and size of the Receive_Anomaly (Anomaly_Recvd) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
anomalies	assignee	value = name of analyst	20
	state	value = analysis	1

4.2.1.3 IPC Mechanism

Through the anomaly detail screen, the analyst can fill in the assignee slot with his/her name. This designates the analyst who is responsible for the anomaly.

Write	Read
AAS/UI	AAS

4.2.1.4 Frequency

This interface is invoked each time the AAS analyst needs to assign his/her name to an anomaly.

4.3 AAS/UI and DMS

4.3.1 Recreate Product Request (AAS_Prod_Req)

4.3.1.1 Description

This interface allows the AAS analyst to regenerate an existing product request in order to analyze a trouble ticket. The original product request must already exist in the LPGS.

4.3.1.2 Format/Size

The format and size of the Recreate Product Request (AAS_Prod_Req) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	whole table row	state = pending	~450

4.3.1.3 IPC Mechanism

Through the UI, the AAS analyst can regenerate an existing product request with a new product ID. In this case, a whole product_requests table entry is generated by the UI. The status is set to "pending".

The UI enters the new entry in the table with status set to "pending". DAD reads the product_requests table, looking for a status of "pending" as an indicator that it needs to get L0 data from the ECS.

Write	Read
AAS/UI	DAD

4.3.1.4 Frequency

This interface is invoked each time the AAS analyst needs to generate a product request to analyze a trouble ticket.

4.4 UI and DMS

4.4.1 Acknowledge L0R Product Receipt (DMS_User_Input)

4.4.1.1 Description

This interface notifies DUI when the L0R product has been ingested manually. Upon notification, the DUI stages the product for processing.

4.4.1.2 Format/Size

The format and size of the Acknowledge L0R Product Receipt (DMS_User_Input) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
message_type	Character	value = ingest	1
product_request_id	Character	Product request ID	20
file_location	Character	Location of L0R product ingested by operator	256

4.4.1.3 IPC Mechanism

This interface uses an Oracle pipe to transmit its contents to DUI.

4.4.1.4 Frequency

The contents of this interface are sent from the UI to DUI upon receipt of the operator request to acknowledge the manually ingested L0R product.

4.4.2 Delete Product Request Files and Directories (DMS_User_Input)

4.4.2.1 Description

This interface notifies DRM that the operator has requested the deletion of files and/or directories for a product request.

4.4.2.2 Format/Size

The format and size of the Delete Product Request Files and Directories (DMS_User_Input) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
message_type	Character	value = delete file/directory	1
product_request_id	Character	Product request ID	20

4.4.2.3 IPC Mechanism

This interface uses an Oracle pipe to convey to DRM the command name and the associated product request ID.

4.4.2.4 Frequency

The contents of this interface are sent from the UI to DRM each time the operator invokes a request to delete files and directories of a product request.

4.4.3 Delete Characterization Results (DMS_User_Input)

4.4.3.1 Description

This interface notifies DGR that the operator has requested the deletion of characterization results for a product request.

4.4.3.2 Format/Size

The format and size of the Delete Characterization Results (DMS_User_Input) interface are as follows:

Parameter	Type	Comment	Size (Bytes)
message_type	Character	value = delete trending	1
product_request_id	Character	Product request ID	20

4.4.3.3 IPC Mechanism

This interface uses Oracle pipes to transmit to DGR the command name and the associated product request ID.

4.4.3.4 Frequency

The contents of this interface are sent from the UI to DGR upon receipt of the operator request to delete the characterization results.

4.4.4 Cancel Product Request (L1_Prod_Cancel_Req, Cancel_Info)

4.4.4.1 Description

This interface notifies the DAD, PWC, PWS, and DRM tasks that the operator has requested cancellation of the processing of a product request and identifies the product request that is to be canceled.

4.4.4.2 Format/Size

The format and size of the Cancel Product Request (L1_Prod_Cancel_Req, Cancel_Info) interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	cancellation_status	value = pending	1

After the cancellation has been processed, the following data are updated as well.

Table	Parameter	Comment	Size (Bytes)
product_requests	cancellation_status	value = done	1
	delete_flag	value = deletable, deleted	1
	state	value = canceled	2
	trending_data_xfer_flag	value = deletable, deleted	1
work_orders	state	value = canceled	2

4.4.4.3 IPC Mechanism

The UI updates the product_requests table's cancellation_status to "pending". DAD, PWS, and PWC read the cancellation_status before continuing their normal processing.

Write	Read
UI	DAD, PWS, PWC

If DAD, PWS, or PWC finds a cancellation_status of "pending", it processes the cancellation and sets the cancellation_status to "done", the product_requests state to "canceled", the trending_data_xfer_flag to "deletable", and the delete_flag to "deletable".

DRM periodically polls the database for the delete_flag to determine which products can be deleted. After each successful deletion of a product request, DRM updates the product_requests table's delete_flag and trending_data_xfer_flag to indicate that the products were "deleted".

Write	Read
DAD, PWS, PWC, DRM	DAD, PWS, PWC

4.4.4.4 Frequency

The contents of this interface are updated by UI, PWC, PWS, DAD, and DRM each time the operator cancels a product request.

4.5 UI and PCS/DMS

4.5.1 Promote Product Request

4.5.1.1 Description

This interface allows the operator to promote a product request.

4.5.1.2 Format/Size

The format and size of the Promote Product Request interface are as follows:

Table	Parameter	Comment	Size (Bytes)
product_requests	promote_flag	value = true	1

4.5.1.3 IPC Mechanism

A screen is provided from which the operator can select an existing product request and promote it.

Write	Read
UI	PWS, DAD

4.5.1.4 Frequency

This interface is invoked each time the operator needs to promote a product request based on an ECS request via e-mail or phone.

4.5.2 LPGS System Shutdown

4.5.2.1 Description

This interface allows the operator to shut down the LPGS in either a graceful, expedited, or emergency mode.

4.5.2.2 Format/Size

The format and size of the LPGS System Shutdown interface are as follows:

Table	Parameter	Comment	Size (Bytes)
ipc_directives	directive	value = graceful, expedited, or emergency	1
	recipient	value = PSI	1

4.5.2.3 IPC Mechanism

A screen will be provided from which the operator can select how to shut down the LPGS.

Write	Read
UI	PSI

4.5.2.4 Frequency

This interface is invoked each time the operator wants to shutdown the LPGS.

4.5.3 View System Messages and Halts

4.5.3.1 Description

This interface allows the operator to view system messages and halts.

4.5.3.2 Format/Size

The format and size of the View System Messages and Halts interface are as follows:

Table	Parameter	Size (Bytes)
events	whole table row	~380

4.5.3.3 IPC Mechanism

A screen is provided where alerts, halts, and other system messages are displayed. The screen is updated periodically based on a configurable parameter.

The operator selects the View Events Log menu item. The Events screen is opened and populated with the most recent events. Additional events can be viewed by scrolling down the screen.

Write	Read
All LPGS tasks	UI

4.5.3.4 Frequency

This interface is invoked each time the operator opens the events screen. It is refreshed within a configurable parameter.

4.5.4 LPGS System Startup

4.5.4.1 Description

This interface allows the operator to start all the background tasks as a group.

4.5.4.2 Format/Size

The format and size of the LPGS System Startup interface are as follows:

Table	Parameter	Comment	Size (Bytes)
ipc_directives	directive	value = start all	80
	recipient	value = PSI	2

4.5.4.3 IPC Mechanism

A screen is provided from which the operator can elect to start the LPGS.

The operator opens the LPGS System Startup screen and elects to start all the tasks. The ipc_directives table is updated. This launches a script that starts PSI as a background task. PSI is then responsible for starting its children, the LPGS background tasks, and monitoring them.

Write	Read
UI	PSI

4.5.4.4 Frequency

This interface is invoked each time the operator elects to start the LPGS. This should occur infrequently.

4.6 QAS and AAS/PCS

4.6.1 Approve/Disapprove Visual Image

4.6.1.1 Description

The Approve/Disapprove Visual Image interface allows the user to approve or disapprove the L1 image during work order processing. Approving or disapproving the intermediate image results in an update to the work_orders state field. Disapproving the image also adds a row into the anomalies table.

4.6.1.2 Format/Size

The format and size of the Approve/Disapprove Visual Image interface are as follows:

Table	Parameter	Comment	Size (Bytes)
work_orders	state	value = resumable or anomaly	2
anomalies	product_request_id	value = product request ID	20
	anomaly_id	value = serial ID assigned by database	6
	origin	value = internal	2
	date_entered	value = current date and time	21
	state	value = pending	1
	current_wo_id	value = work order ID	7
	title	value = image rejected due to ...	80

4.6.1.3 IPC Mechanism

QAS updates the state in the work_orders table and also adds an entry to the anomalies table if the image is not satisfactory. PWS looks for a state of “resumable” in the work_orders table in order to continue processing the work order. AAS processes the new entry in the anomalies table.

Write	Read
QAS/UI	PWS, AAS

4.6.1.4 Frequency

This interface is invoked by QAS/UI each time an intermediate image is approved or rejected.

4.7 UI and QAS

4.7.1 View Results

4.7.1.1 Description

The View Results interface allows the QAS analyst to see results from Q1R and Q1G analysis.

4.7.1.2 Format/Size

The format and size of the View Results interface are as follows:

Parameter	Type	Comment	Size (Bytes)
wo_id	Character	Identifies work order whose results are to beviewed	7

4.7.1.3 IPC Mechanism

The user selects a work order identifier, QAS/UI retrieves data from the qas_results table and displays it on the screen.

4.7.1.4 Frequency

This interface is activated each time the user selects to view Q1R or Q1G results.

Abbreviations and Acronyms

AAS	Anomaly Analysis Subsystem
CC	cubic convolution
COTS	commercial off-the-shelf
CPF	calibration parameter file
DAN	data availability notice
DBMS	Database Management System
DCN	document change notice
DEM	digital elevation model
DMS	Data Management Subsystem
ECS	EOSDIS Core System
EDC	EROS Data Center
EOSDIS	Earth Observing System Data and Information System
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System
ETM+	Enhanced Thematic Mapper Plus
GPS	Geometric Processing Subsystem
HDF	Hierarchical Data Format
IC	internal calibrator
IDD	interface definitions document
IPC	interprocess communication
L0	Level 0
L0R	Level 0 radiometrically corrected
L1	Level 1
L1G	L1 geometrically corrected
L1R	L1 radiometrically corrected
LCC	Lambert Conformal Conic
LPGS	Level 1 Product Generation System

MSCD	mirror scan correction data
MTF	modulation transfer function
NN	nearest neighbor
ODL	Object Descriptive Language
OM	Oblique Mercator
PC	Polyconic
PCD	payload correction data
PCMB	Project Configuration Management Board
PCS	Process Control Subsystem
PDR	product delivery record
PS	Polar Stereographic
QAS	Quality Assessment Subsystem
RPS	Radiometric Processing Subsystem
SOM	Space Oblique Mercator
TM	Transverse Mercator
UI	user interface
URF	user request file
UTM	Universal Transverse Mercator
WRS	Worldwide Reference System